WAR GAMING

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MILITARY PLANNING IN AN UNCERTAIN WORLD

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[1] Has already appeared as RM-1829-1

[2] Has already appeared as P-1165

[3] Has already appeared as P-1166

[4] This document

[5] Has already appeared as RM-1937

It should be clear from our discussion of game theory that it is very difficult to solve analytically a game like poker. Nonetheless, some people are very skillful at this game. Their skill has been acquired in two ways. First and foremost, by experience, i.e., by actually playing the game a great number of times and learning from these plays what are good strategies. Secondly, by profiting from such mathematics, (particularly of the probabilistic type), as can be done, even though the complete game theoretical treatment cannot. One can calculate, for example, the probability of drawing successfully to an inside straight or the probability of getting a flush; as a result one can learn a good deal about what is wise and what is foolish.

But it is well-known that poker is not merely a simple question of combinatorics. The opponent's actions must be taken into account, particularly the probability of whether or not he is bluffing. The latter is a game theory question. Although, as we said, the game theoretic aspects of real poker have never been treated successfully, there are poker players who know a great deal about it. We too can learn much about more serious real-life games by designing simple games that simulate some aspects of the real world, but that are too complicated to be solved. We can play these games and learn from them. In a sense this is a Monte Carlo approach to the problem of solving a complicated game. Insofar as it is, some of the considerations about Monte Carlo that we have already mentioned are relevant.

There are four levels of War Gaming which we would like to distinguish.

1. The Informal Game

This is a conscious attempt to try to take account of the enemy's reactions. It is sometimes played inside one man's head. One simply asks

himself "what would the enemy do if I did this," or "what does he think I
will do if he does such and such?" In an informal game, one tries to look
at the situation from a   . ical point of view, taking account, in a
reasonable way, one's knowledge of the enemy's knowledge about oneself or
what he is likely to know. In fact, one takes into account any properties
or characteristics of oneself or the enemy that seem relevant. This kind
of War Gaming can be done by more than one person. It can be done by two
people, by a group, a staff, or a large number of other people. Simply
to take into account, consciously, the fact that the enemy is not passive,
but actually may be trying to thwart and circumvent you, is almost without
question <u>the most common and important kind of War Gaming</u> that is done (or
sometimes not done).

2. <u>Rule Games</u>

There is another class of games which is very popular. In this class,
the analyst is trying to abstract from the real world a fairly definite list
of rules which all players must observe. In some cases all the rules are
written down explicitly. In other cases, this is too difficult. Some of
the rules may then be left to referees to invent at the last moment.
However, as many of the rules as possible are laid down in advance. The
object is to make a game which could be played as well by two Martians
(mathematicians?), who could read the rules, as by a player who had sub-
stantive knowledge and experience of the issues involved.

Sometimes rule games are used for pedagogical purposes. In order to
teach some principle a game is devised which forces the point home for the
players in a way that is difficult to do by normal exposition. In such
games pseudo—experience replaces exposition. War Gaming is amazingly

effective for teaching obvious ideas that people have resisted because
they run counter to doctrine, or are unpleasant e.g., if one's airforce is
exposed to destruction, the enemy may destroy it.

If the players are willing to accept the assumptions that are embodied
in the rules, they are often forced to accept conclusions with an intensity
which would not be there if these same conclusions arose in the course of a
briefing or a lecture. There is, of course, no guarantee that the points
that are taught are correct. In fact, the opposite may be true. Because
the players have a sense of participation, their critical sense is often
dulled. Intensity of communication, rather than correctness of conclusion,
is the hallmark of the pedagogical game.

It is also possible that one can learn skills from games which carry
over to the real world. Some people even argue that games can be devised
which will be good tests of the military competency of the players. It
is our opinion that both of these ends are very difficult to accomplish
with pure rule games. We can only admire people for putting research into
this effort and wish them well. However, experience has shown that it can
be a very stimulating experience to play these games and we expect that one
of the most useful applications of rule games may be in schools or study
groups as a portion of a larger program.

One thing which the formal rule game is not very well adapted for is
empirical research. Only very rarely, if ever, does the play of a Rule
War Game turn up valid conclusions about the real world which could not
have been deduced in an immediate way directly from the rules. In every
game of this type, that the authors have seen, the interesting results of
the play have always been completely and obviously prejudged by the rules.

Once these rules have been made up the research is just about finished;
actual play of the game produces very little information. This is why the
game has the previously described quality of being a pedagogical tool
rather than a substantive research tool.

This is not at all surprising. Generally speaking, most real world
systems are either very good or very bad. One property of a good system
is that it looks good under a wide variety of assumptions and conditions.
Under these circumstances it is generally obvious that the system is good
and it does not take very skillful play to see it. A similar situation
seems to be true when a system is bad. In the occasional situation when
the system described by the rules of the game is so controversial that
it takes play to decide what the implications of the rules are, one still
cannot usually claim that play actually turned up substantive facts about
the real world. If the situation is controversial, the results are in-
variably sensitively dependent on the rules assumed, and a minor change
will completely alter the results. In these cases, one would have to do
a contingency and sensitivity analysis while playing the game to really
understand the situation. This seems to be too difficult to do.

These last paragraphs on the valuelessness of Rule Games for empirical
research deserve at least two qualifications. We mentioned in the previous
chapter on game theory that one of its main values lies in the fact that it
takes a very idealized aspect of the situation and treats it completely.
While this idealization may turn out to be a very approximate and incomplete
picture of the real problem, it is nevertheless quite important to understand
these idealized aspects thoroughly. One's intuition and grasp of complex
problems is usually better if one understands the simpler ones. It is clear

that there might be idealized games which are simple enough to be powerful
aids to the intuition and general understanding, and yet too complex to be
treated by game theory. One might then want to treat this kind of game by
either numerical or war gaming (Monte Carlo?) techniques.

The second qualification is even more to the point. One reasonable
way to initiate research is to ask people to make up a reasonable set of
rules for a game of this character. The attempt to draw up the rules will
force them to look very hard at whole classes of problems. They have to
think about them in a thorough way because they have to make definite and
usually quantitative statements about every aspect of the situation.
Indeed, making up rules for a game always involves research, sometimes in
a very productive way. In addition the design of a large detailed rule
game may be a useful way to summarize, integrate, and evaluate research
that has been done in bits and pieces. It acts as a sort of jigsaw puzzle.
It not only fits together the research that has been done, but it also makes
the lacunae stand out. (However, our friends in economics tell us there are
other methods besides the construction of rule games to motivate such
activities, e.g., an extra $5,000 a year.)

3.   The Formal Minimum Rule Game

Let us look now at the game which has only a few explicit predetermined
rules. This is not because there are a priori or in-principle objections to
explicit rules, but because it is one of the objects of the game to investi-
gate what are sensible rules. This sort of game is less a formal game than
a social situation. Roughly, it can be described as follows.

A number of skilled experts are gathered together, with their assistants.
These people are to study a certain problem area; hopefully they will interact

with each other in an intimate and fruitful way over a fairly lengthy period
of time. In addition, they must work in a concrete and detailed way. Most
important of all, one wants a critical examination of all the work while it
is being done.

One way not to do this would be to lock them up in a conference room
and say, "Get to work." There might be an initial period where there was
an exchange of views and people learned about the issues. After this
initial period, conferences tend to stagnate into interminable arguments
and dissensions or into feasts of agreement. Therefore, after the first
interaction period is over, there tends to be very little constructive
work. Almost the best thing the conferees can then do is write a report
and go home.

If, on the contrary, these same people are asked to play a game, the
situation is quite different. The individual players then take sides.
They will study the problems associated with their sides with passionate
interest and devotion. In fact, experience has shown, with too much
passion. There will be a real impetus to doing constructive work and to
criticize assumptions which favor the opposition.

If the referees are skillful, they will let the players do a great
deal of arguing about the interpretation of what is reasonable or un-
reasonable. After all, the referees' decisions should often themselves
be the product of research, and one wants the players to contribute their
knowledge and experience to these decisions. However, when the discussion
tends to drag out or become intolerable, the referee has the privilege of
making a flat decision which cuts off controversy and allows the game to
continue. He is in a much better social situation than a chairman of a

conference for everybody has to accept his decisions with good grace. Not
only does he have the legal authority, but our whole tradition of being
"good sports" enforces his authoritative power.[1] The only retaliation a
player possesses is to write a paper. Since it is one of the referee's
jobs to stimulate such papers, he can be unperturbed even if the paper is
vitriolic.

In fact, the game gives a very good environment for the output of all
kinds of detailed papers on policy, hardware, or context questions which
ordinarily wouldn't get written. Furthermore, the fact that the players
themselves are pretending to take active roles in affairs forces them to
think in a concrete and relatively responsible way about problems which
they normally tend to discuss in lofty and abstract terms, often overlooking
important qualifications. One is much more likely to get feasible sugges-
tions from a War Game context than from a person working in isolation.
(Of course, really scholarly work or good technical analysis probably can-
not be done in this feverish atmosphere, although it may be inspired there.)

On the whole, this kind of activity is very promising. However, one
should recognize clearly that the value of the results is almost com-
pletely dependent on the skill of the players and, even more, on the skill
of the referees. There seems to be a tendency to overlook this point.
Many people, in reporting the results of gaming place a heavy reliance on
the fact that the results came out of a game. The implication is that
any kind of War Gaming automatically gives conclusions a little extra degree
of reliability. Aside from the fact that they should have had at least a
moderate amount of hostile scrutiny (which may have been ignored), there

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[1] We are here ignoring the Brooklyn Dodgers "kill the umpire school."
it is to be assumed that very few of this group will ever qualify to
participate in a war game.

is no reason for this belief.

Any substantive results that come out of a War Game should be justi-
fied on their own merits. The fact that they came out of a game is almost
completely irrelevant to their reliability. One has to justify them in
the same way one justifies any idea.

It may be, from the pedagogical point of view, a very good idea to
present the results in the setting given by the history of the game. This
is sometimes a clear and vivid way to talk about the issues. One should,
however, never fall into the error of trying to justify the results by the
history produced by the game, but rather the opposite. One first justifies
the results. This may or may not make the history seem plausible. (As we
will mention later, one often wants to study implausible histories.)

There are some other comments that should be made about this kind of
War Game. First, there should be no overwhelming compulsion to try to
simulate every possible aspect of reality in the details of the game. For
example, the pattern of information flow and decision making, which corres-
pond to the real world, doesn't have to be followed by the players. While
certain players may be appointed to think about the enemy as their chief
responsibility, one can still ask them in for consultation on other ques-
tions. In fact, one can reveal to them ostensibly secret information about
the other side in order to consult with them about some question which has
arisen. Similarly the player who takes the part of our own country might
well be asked to advise the enemy on what would be sensible actions for him.

If, as a result of this close consulting, information which one does
not think would actually leak in the real world, does leak, one simply asks
the player to act as if he did not know about the information. We admit

this may be difficult to do in practice, but if a player is reasonable and asked to act as if he does not know a piece of information, he is probably as good an analogue of the real honest-to-goodness opponent as the player who does not actually know the information. There are so many important and relevant ways in which the analogue fails as a straight analogue that the mere question of pretending lack of information itself while not irrelevant, is not dominant.

This does not mean that one does not want to have any analoguing in the game (including security aspects), but simply that there is nothing sacred about the analogue. It may or may not be followed, as convenience suggests. The important thing is to have enough of an analogue so that players feel they are playing roles instead of merely partaking in an elaborate conference. Nothing else is essential.

A second thing to emphasize is that the game should not necessarily concern itself only with probable situations but should also emphasize "interesting" situations. It is true that one way a situation can be interesting is because it is probable, but it is also true that often relatively improbable situations are very interesting because if they occur they are so extraordinarily important. That is, the game should be guided into a study if situations about which one wishes to be educated and not simply because one thinks they are most likely to happen. It is not the purpose of the game to be an oracle.

The whole question of how much of an oracle the war game can be expected to be is quite interesting. Experience has shown that people often tend to adopt the same solutions to similar problems. Insofar as this is true, a realistic war game may predict the future, or at least some aspects

of it, quite accurately. In fact, it has been claimed that War Gaming is
a very valuable adjunct to intelligence activities because merely looking
at something from the opponent's point of view in a detailed and concrete
way, may indicate what the opponent will do -- also in a detailed and
concrete way. Even things like troop dispositions might be predicted by
this technique.

However, admitting all of the foregoing, it is probably wrong to think
of the war game as portraying the future. The re. son for this is, first of
all the obvious one: the future is uncertain. More than that, it is clear
that some very improbable events are sure to occur and that some of these
improbable events will have important effects. By their very nature, it
is impossible to take into account these improbable events. However, insofar
as some parts of the future are more or less determined or even over-deter-
mined by existing constraints, a war game might be successful in exploring
these constraints and, therefore, useful in predictions.

Some other aspects of the minimum rule detailed war game should be
mentioned:

a.   This kind of game usually does provide a possibility of valuable
     training because one can simulate a man's actual job and test at
     least paper responses.

b.   Real war games may occasionally have very dull aspects, i.e., war is
     dull and a game which analogises it may also have periods of dullness.
     While a lot should be done to avoid this, there is a real tendency to
     introduce things arbitrarily and deliberately which eliminate dullness
     (for example things which make the game less onesided). This tendency
     should be guarded against.

c. It is probably true that the role of the consultant should be fairly
    severely circumscribed. While a War Game fulfills some of the
    functions of a conference, it is a different kind of animal and care
    should be taken that it does not degenerate into a conference. In
    particular, this means that most of the players should probably be
    full-time and obliged to come to discussions prepared in a detailed
    way.

d. War Gaming might find a very important application in the testing of
    hypotheses generally and War Plans in particular. The formal structure
    of the game almost automatically subjects the plan to a semi-hostile
    critical review and, what may be more to the point, the planners them-
    selves may be forced to take realistic looks at their plans. However,
    it is not suitable for the testing of "brilliant" or "psychological"
    strategies that depend on assumed weaknesses of the enemy (although
    it may suggest such strategies). War Games which make a big thing
    of assumed weakness of the enemy have had a rather dolorous history.

e. One of the major weaknesses of large minimum rule war games is that
    they tend to be so expensive in time and manpower that it is impossible
    to consider many variations of a scenario. However, experience has
    shown that once a group has gone through any particular scenario they
    have often learned so much about the situation that they can talk
    themselves through variations in a quite fruitful way. In particular,
    it is possible to hold a formal conference after a war game to discuss,
    "What would have happened if instead of assuming _____,
    we had assumed _____?". Whether or not the conferees
    should be assigned roles or be on an equal footing depends on special

circumstances but almost all variations have proved fruitful in practice.

4. Realistic War Games

War Games and training maneuvers are historically an old activity, but that doesn't make them any less important. In fact, modern conditions have made them even more important because so much of the equipment that is used by the armed forces has never been tested in a realistic environment or in realistic contexts. They are all tested under simulated conditions where the simulations have to be very simple because one cannot supply even an unrealistic war time environment at a proving ground. In particular, logistic, service and alert organizations have no other adequate method in peace time of testing their performance. Because the training aspects of a real war game are so large, one cannot afford to let realism, in the sense of overall realistic situations, interfere with letting most of the participants get their training. It is, therefore, doubly important to be conscious of the unrealistic elements if the game is to be used for evaluation purposes as well as training. Maneuvers and training exercises do have a very important role in evaluation, but it takes a great deal of judgment to use their results. They generate a great deal of substantive information, much of which may have a sobering influence on people too addicted to official planning factors, but they are almost always completely unreliable analogues of even the current situation, let alone the future.